

Greening the Building Process City of Scottsdale

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City of Scottsdale



Overview

1. Industry Trends & Benchmarks
2. Codes & Standards
3. Green Building Programs
4. Scottsdale Green Building Policy and Program Initiative

Green/Environmentally Responsible Buildings

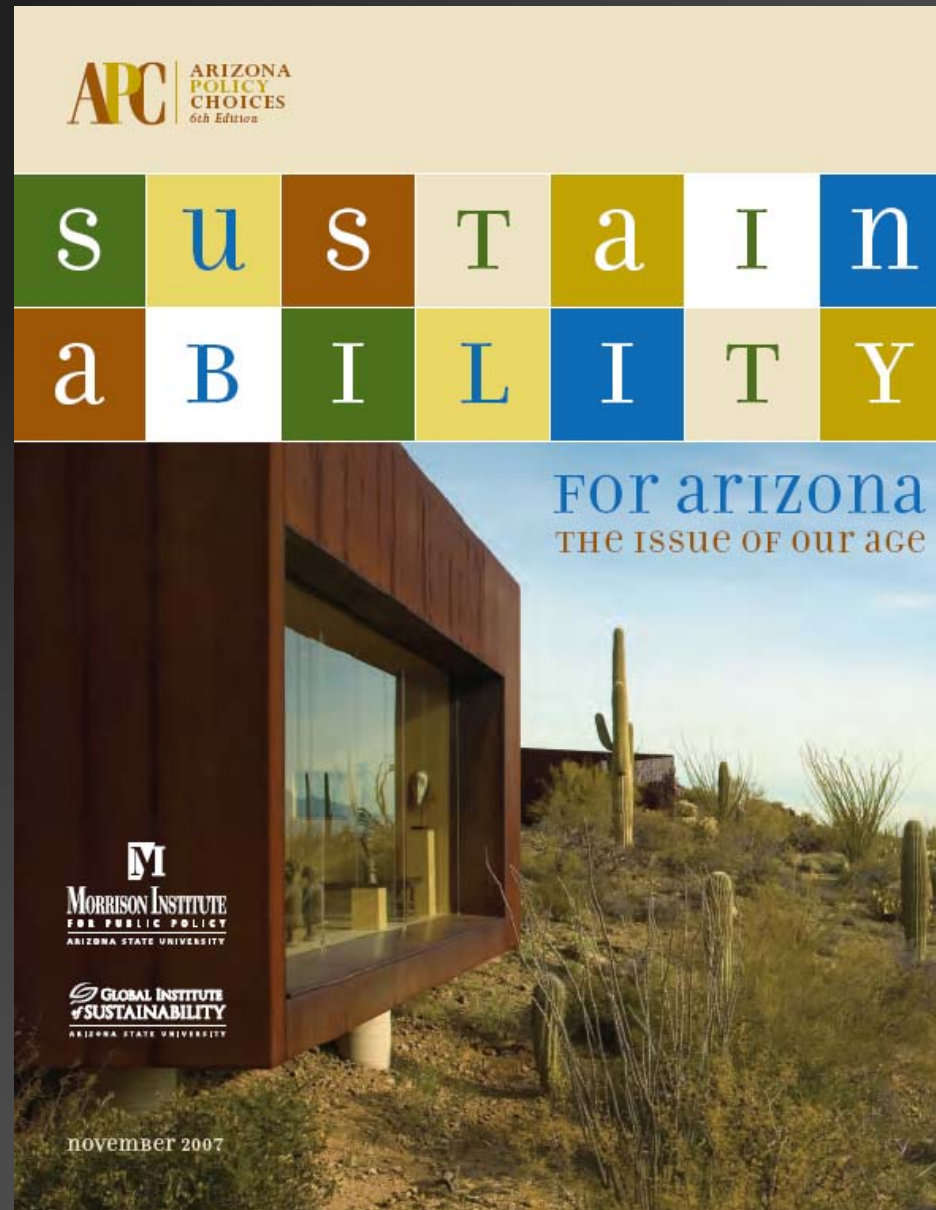
- Integrated, whole-systems approach.
- Creating synergy between climate, building use, and place.
- Considers larger ramifications of design, material selection and building practices.

Sustainability: The triple Bottom Line



“Scottsdale is committed to the effective management of our finite and renewable environmental, economic, social and technological resources to ensure that they exist to serve future needs. It is essential that there will always be sufficient resources to maintain the level of services, environmental quality, economic vitality, and access to amenities that contribute to the quality of life Scottsdale offers today.”

Scottsdale CityShape 2020, 1996



Morrison Institute/Global Institute of Sustainability



Shades of Green

- All buildings provide some level of environmental attributes
 - Passive and active systems
- Baseline measures
 - Local code and ordinance requirements

Industry Trends & Benchmarks

- Environmental Protection Agency (EPA)
guidelines, standards and programs

- Energy Star Buildings

- certifies new homes, buildings and more than 40 types of products that are energy efficient



- Energy Star - Indoor Air Package

- certifies homes that protect against moisture and mold, pests, combustion gases, and other airborne pollutants



- WaterSense

- identifies products and services that meet water-efficiency performance criteria for plumbing fixtures and landscape irrigation



Industry Changes & Trends

- Bans and restrictions
 - CCA treated wood in building construction
 - VOC's, lead and asbestos
- Energy Policy Act of 2005 (effective 1/1/06)
 - provides tax credits for homes and businesses utilizing solar technologies and/or designed to use 50% less energy as compared to minimum energy code requirements
 - New construction
 - Building improvements
 - Energy-efficient appliances
 - Renewable energy

Industry Changes & Trends

■ State of Arizona Incentives

- Tax Credits for Energy Efficiency and Renewable Energy
 - Personal Income Tax Credit, Sales Tax Exemption, Solar Energy Property Tax Exemption
- Utility Solar Incentive Programs
 - For solar PV, rebate is \$3 for each DC Watt of rated solar electric power installed in a grid-tied application (or 50% of the total system cost – whichever is less) up to 10,000 Watts
 - For solar water heater systems (not exceeding 10,000 kW hours per year), payment is based on system's yearly kW hour rating of 0.50 cents per kW hour.
- Demand Side Management (DSM)

Industry Trends & Benchmarks

■ Improved Green Labeling Programs

- Green Seal, GreenGuard
- FloorScore (Resilient Flooring Covering Institute), Green Label Plus (Carpet and Rug Institute)
- Forest Stewardship Council (FSC) and Sustainable Forest Initiative (SFI)



Industry Trends & Benchmarks

- New materials and products that improve opportunities for higher benchmarks:
 - Energy efficiency
 - Water efficiency
 - Material resource efficiency
 - Indoor environmental quality



Industry Changes & Trends

■ National Green Building Rating Programs

- U.S. Green Building Council (USGBC)
- National Association of Home Builders
- Green Globes
- Environments for Living
- Energy Star Buildings



■ Regional Programs

- Local and state GB program
- Water, heat island effect, solar energy

■ General public awareness

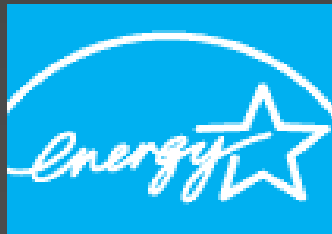
- Energy, health and environmental issues

Codes and Standards

Green Building Measures

Rating Systems

LEED
Energy Star
Green Globes
NAHB
Local GB Programs



Standards

ASTM
ASHRAE
Green Seal
GreenGuard
Local Std's



Codes & Ordinances

IBC
IMC
IECC
Local Ord's





ICC

Green Building Policy

January 2007

- Green Building/Sustainable Communities
 - commitment to social responsibility and expand the boundaries of public safety
 - advocate for green building in the legislative, regulatory and codes arenas
- Green Building Resource Web Link
 - www.iccsafe.org/news/green

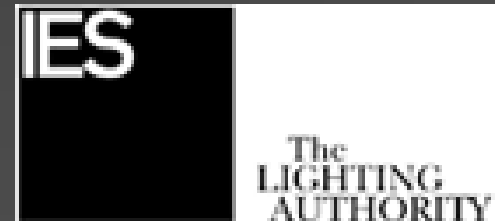


Scope of Building Codes

- International Building Code
 - 101.3 The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through ... adequate light and ventilation, energy conservation, ... and other hazards attributed to the built environment ...

Commercial Green Building Standard

- Development of national standard for the Design of High-Performance Green Buildings - Std. 189
 - will provide minimum baseline requirements for commercial buildings



Residential Green Building Standard

- Development of National Green Building Standard for single and multi-family dwellings
 - Cater to mainstream residential builders
 - Serve as a national benchmark and rating tool for HBA's and governmental entities
 - Based on NAHB Model Green Home Building Guidelines
 - ICC and NAHB are co-sponsors

Green Building Programs

Local and State Governmental Programs

- Arkansas
- Arizona
- California
- Colorado
- Florida
- Georgia
- Hawaii
- Illinois
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New Jersey
- New Mexico
- New York
- North Carolina
- Ohio
- Oregon
- Pennsylvania
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- Washington, DC
- Wisconsin

Local Leaders in Sustainability



*A Study of
Green Building Programs
in Our Nation's Communities*

The American Institute of Architects



2007 Study of Green Building Programs

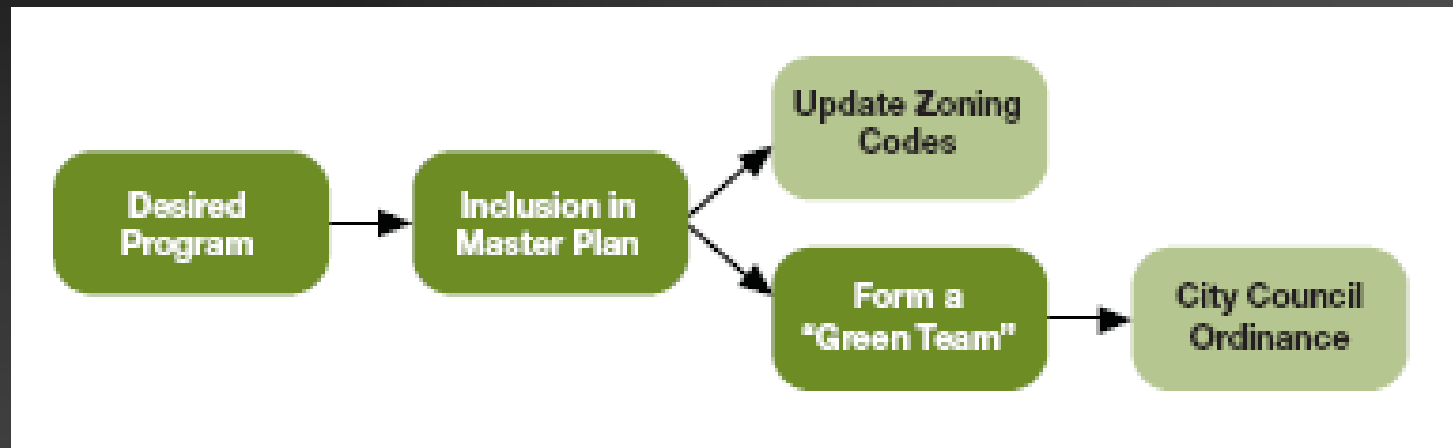
- Examines growth and effectiveness of Green Building Policies in cities



2007 Study of Green Building Programs

- Ninety-two cities have green building programs, or 14 percent of all cities with a population greater than 50,000
- Thirty-nine percent or about 42 million Americans live in cities with green building programs

Multiple Paths to Green Building Policy



■ Path 1

- Executive Directive

■ Path 2

- Department Initiative

■ Path 3

- Citizen Initiative

Local and State Ordinances

- Public facilities

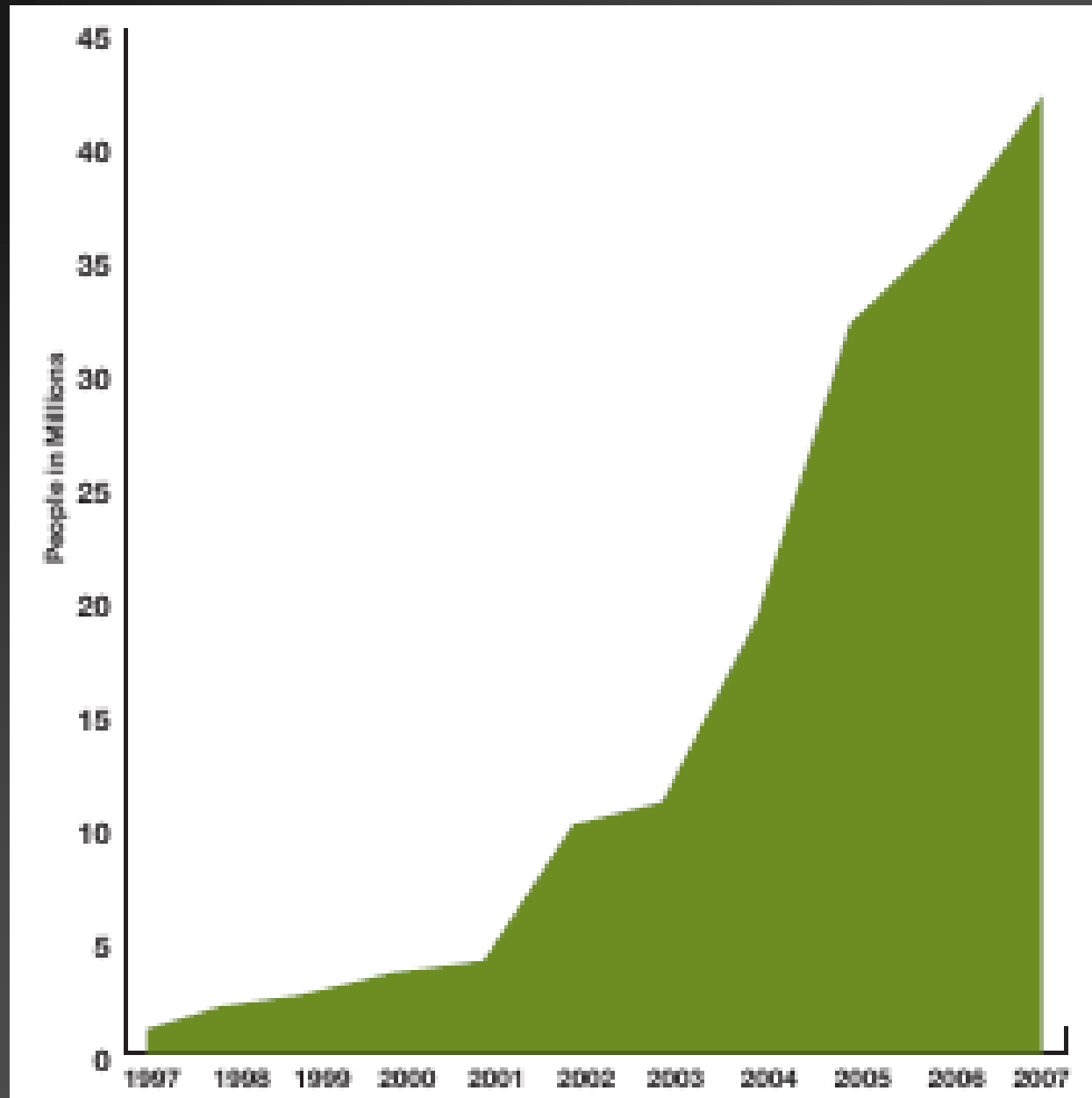
- mandate to meet LEED or equivalent green building rating benchmark
- lead by example

- Private development

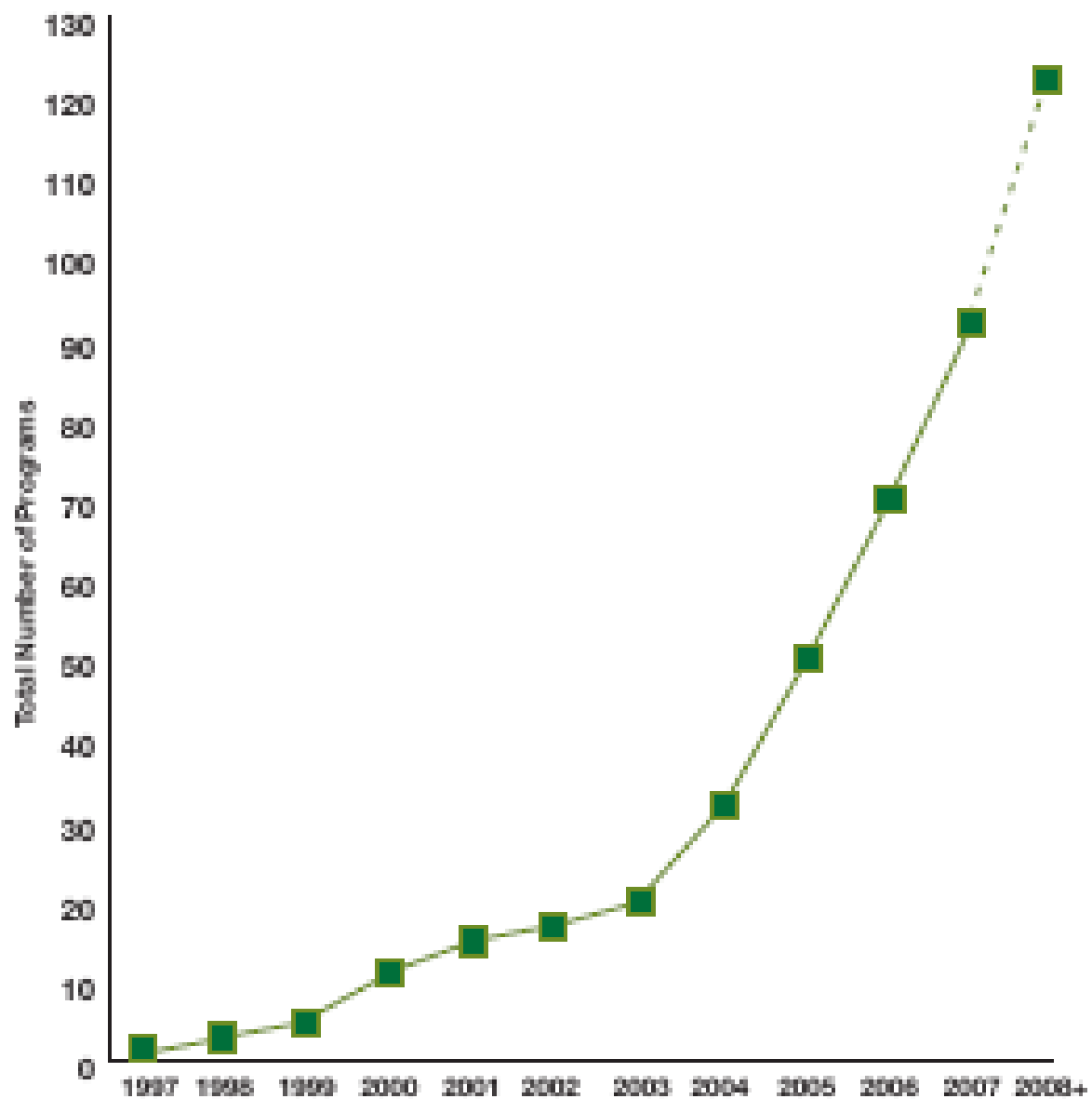
- incentives and mandates



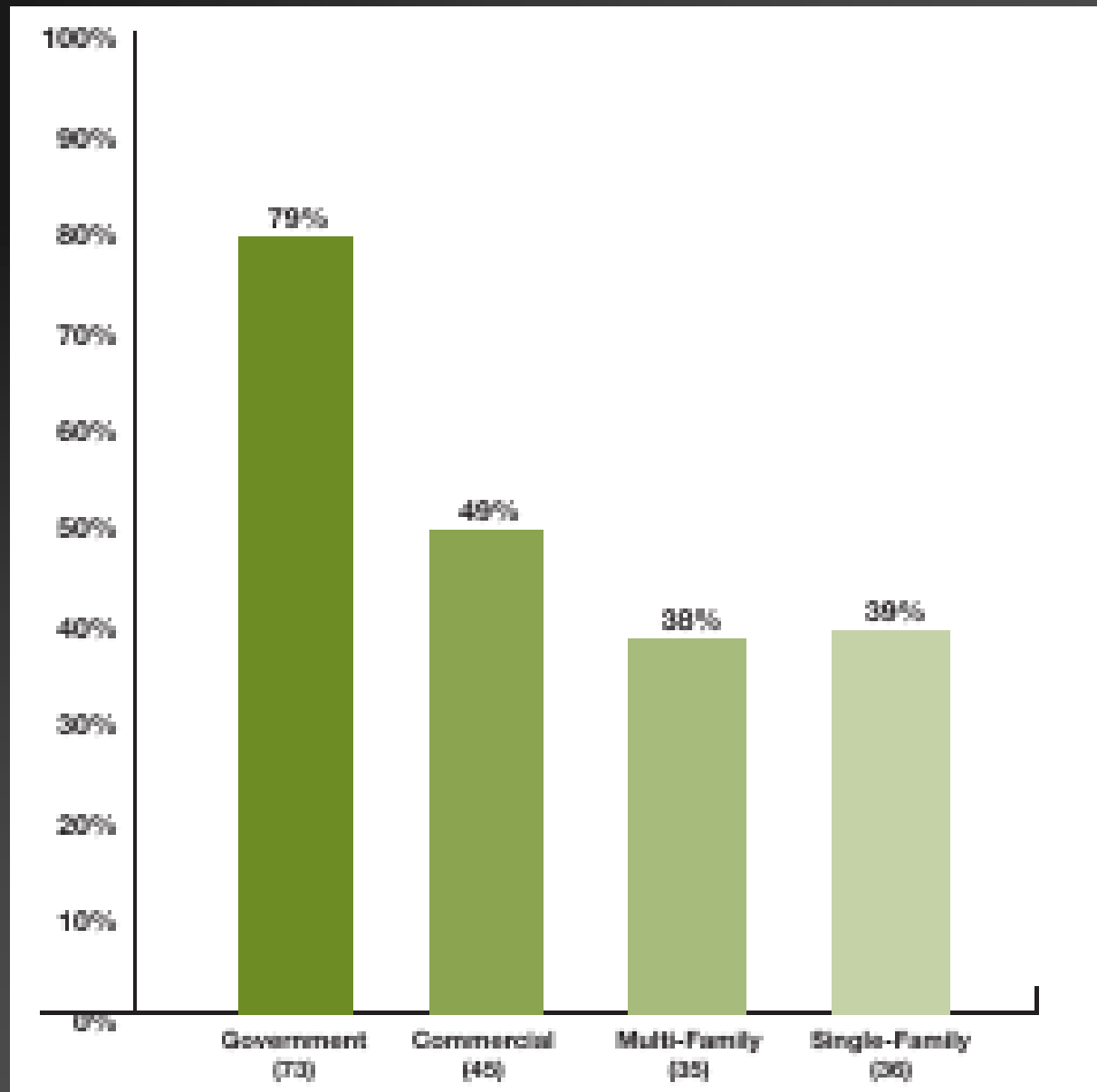
Green Building Programs in Cities with a Population over 50,000



U.S. Population living in Cities with Green Building Programs



U.S. Cities with Green Building Programs



Number of GB Programs that apply to governmental, commercial, multi-family, and/or single family residential buildings.

Market Based Programs

- LEED
- Green Globes
- National Association of Home Builders (NAHB)
- EPA Energy Star
- Environments for Living
- Utilities
- Private sector





Energy Star Label

- ENERGY STAR is the government-backed voluntary program for energy efficiency
 - Homes
 - HERS Index
 - Commercial buildings
 - Target Finder
 - More than 50 product types
 - appliances, lighting, office equipment, consumer electronics, and heating/cooling equipment





GLIS IS DOING NOTHING TO
SAVE THE ENVIRONMENT.

BUT HIS EARTHCRAFT HOUSE IS.

Buying an EarthCraft House is a simple way to help our planet.
That's because an EarthCraft House consumes less energy and natural resources.
EarthCraft House builders know how to create healthier, more comfortable homes, reducing utility
bills and increasing value. Any home – from a cottage to a mansion — can be an EarthCraft House.
Find a better builder or renovator at www.earthcrafthouse.org
and do your part to help save the world.



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HEDGEWOOD



"square feet are not the only feet in your home"

Branding campaign from Hedgewood Properties
sends the message that bigger isn't necessarily better.



USGBC and LEED

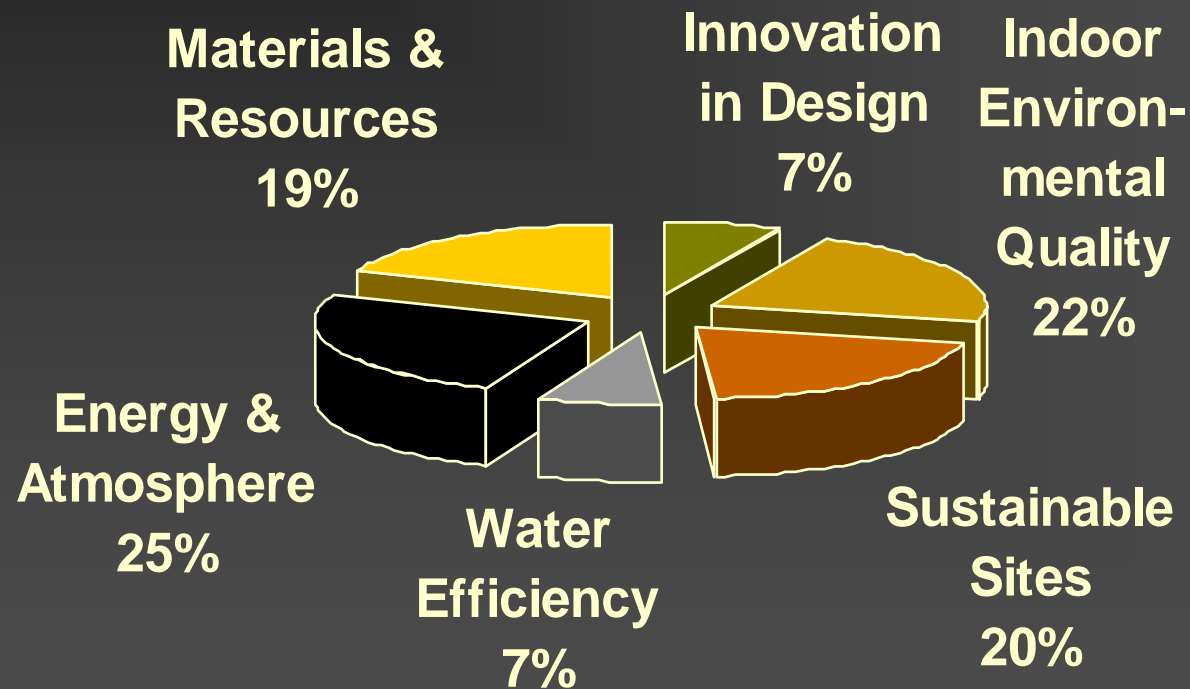
- USGBC is a nonprofit organization based in Washington, D.C.
- Developer and administrator of the LEED Green Building Rating System
 - Tool used to certify the design, construction and operation of buildings



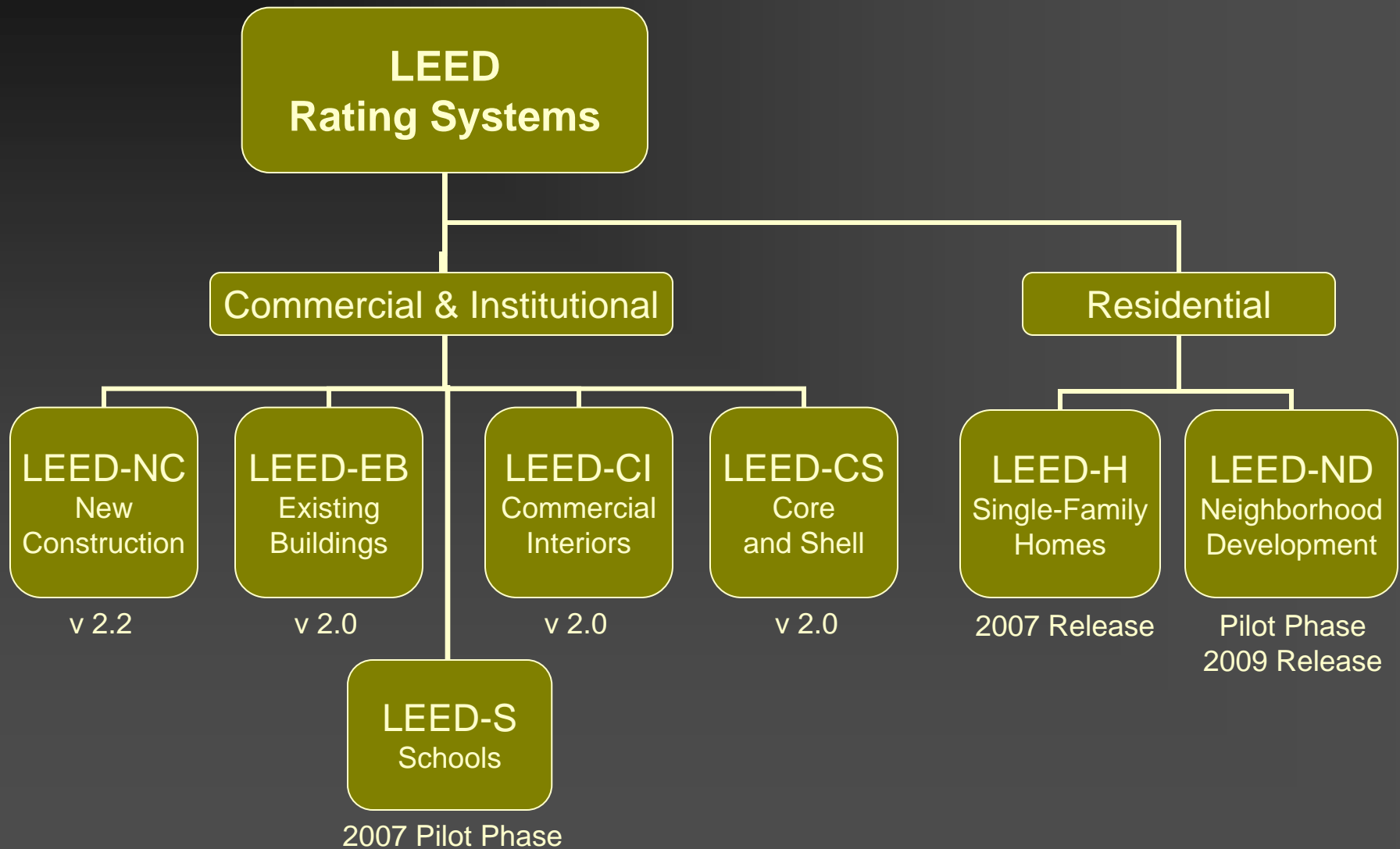
LEED Rating Categories

5 Environmental Categories

1 Innovation Category



LEED Rating Systems





Green Globes

Assessment
and
Certification



Design
Guidance

Online tool

WELCOME TO GREEN GLOBES™:
A **REVOLUTIONARY** WAY TO ASSESS AND RATE YOUR COMMERCIAL BUILDING ONLINE.



Why Build Green?

Green Globes in the News

ATTRIBUTES

INTEGRATED ENERGY
STAR TARGETING

FREQUENTLY
ASKED QUESTIONS

COST

CERTIFICATION

GREEN GLOBES
REPORT

PRESENTATIONS

USER'S GUIDE

CASE STUDIES

TEST DRIVE
GREEN GLOBES

PURCHASE GREEN
GLOBES ASSESSMENT



REVOLUTIONARY

Green Globes™ is more than an assessment tool. It's like having a 24-hour sustainability design consultant on line.

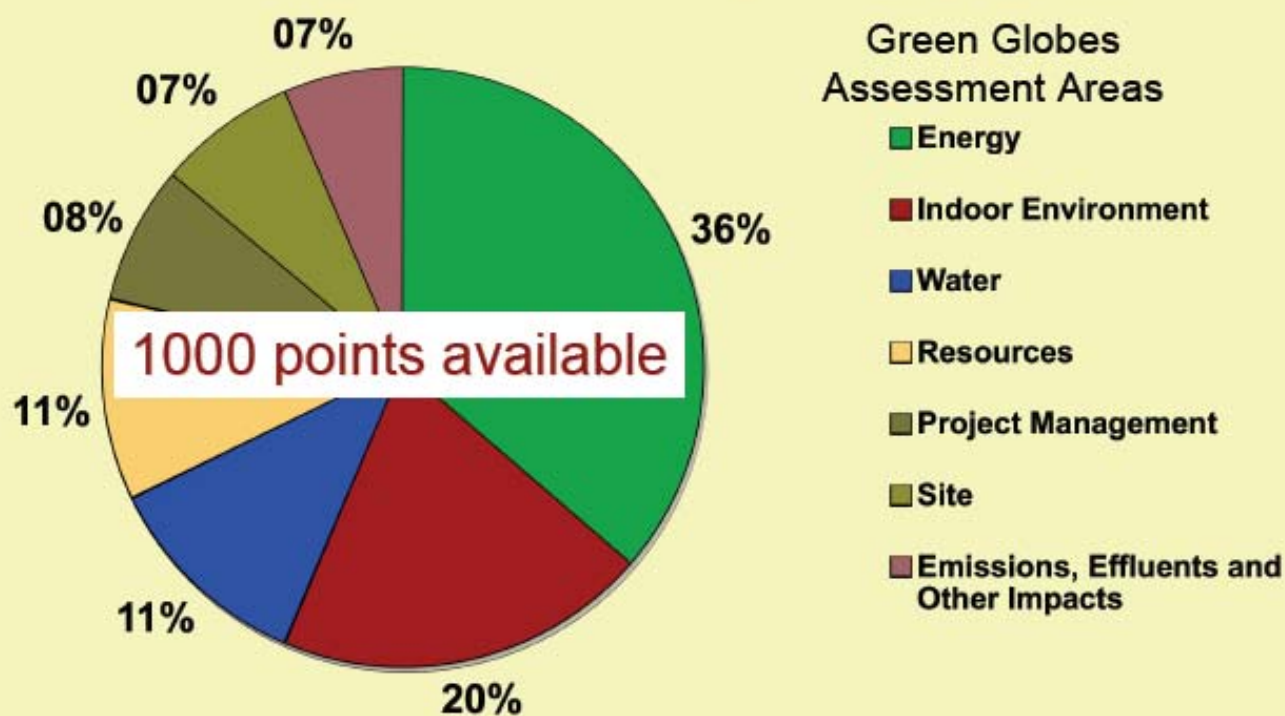
Green Globes™ is not only the first interactive,

Want to learn more about the
Green Globes™ system?

Attend our free Webinar
online seminar!

Green Globes Categories

AHP Weighting



AHP: Analytical Hierarchy Process



Commercial Building Rating

Scottsdale Green Building Policy and Program Initiatives



Planning for Sustainability

1. General Plan
2. Sensitive Design Principles
3. Environmentally Sensitive Lands Ord.
4. Water Resources
5. Energy Codes





Green Building Program

Sustainable Building in the Sonoran Desert

- Climatic and geographic characteristics are unique to the region.
- Utilization of local resources such as solar for energy and daylighting.
- Regional materials.





City Resolution

- All new, occupied city buildings shall be designed, contracted and built to achieve the LEED™ Gold certification level.
 - where the payback is anticipated to be more than five (5) years, City staff is directed to recommend to the City Council which level of LEED™ certification is appropriate for that particular project.

Scottsdale Granite Reef Senior Center



Gabor Lorant Architects

Scottsdale's 1st LEED Gold city facility



Scottsdale Senior Center at Granite Reef

View east at Courtyard and south side of building - Transparent solar panels are both functional and an elegant design feature. Activity spaces visually and physically spill out onto the patio.



Scottsdale Senior Center at Granite Reef



View west at Lobby and Patio - Through passive and active solar design along with high efficiency HVAC systems, energy usage is reduced by 282,000 kWh/year.



Lost Dog Wash Trailhead Building
McDowell Sonoran Preserve

Lost Dog Wash Trailhead



■ Building Features

- Rammed Earth
- Sheltered Seating
- PV Power
- Graywater
- Rainwater Harvesting
- Compost Toilets





Scottsdale Fire Station No. 602
Preliminary Design



Green Building Program

- Voluntary program for private development
- Rating criteria
 - residential and commercial projects
- Green Building Advisory Committee
 - program input, policy development and outreach



Incentives

- Expedited review & process assistance
- Market differentiation for builders & designers (directory and signs)
- Promotion material, education & public events



Rating Checklist

- Mandatory Items (28 requirements)
- Rating Options
 - 135 total options with 270 max. possible points
- Rating Levels
 - Entry Level – 50 to 100 points
 - Advanced Level – 100 to 200 points



Integration with Development Process

- Planning and Development
 - Development Review Process
 - Plan Review and Inspections
- Building and Energy Codes
 - IBC, IRC, IECC

Code Amendments

IBC and IRC – 2003 Edition

- 101.4 Reference Codes
 - 101.4.8 Green Building Program. The provisions qualifying projects for the voluntary *Green Building Program* shall apply as long as the project is enrolled in the program.
- 106.1.1 Information on Construction Documents
 - 106.1.1.2 Green Building Program Information. For projects enrolled in the city Green Building Program, the plans shall include applicable green building checklist notes.

Green Project Process

- 1 Project Qualification
- 2 Plan Review & Permitting
- 3 Inspections
- 4 Certificate of Occupancy

Residential Rating Checklist Prerequisites



Mandatory Measures

- Site
 - Protect all exterior entrances from direct summer sun exposures (east, west, south)
 - recessed or covered entry
 - Low water use landscape





Porch Entries





Courtyard Entry

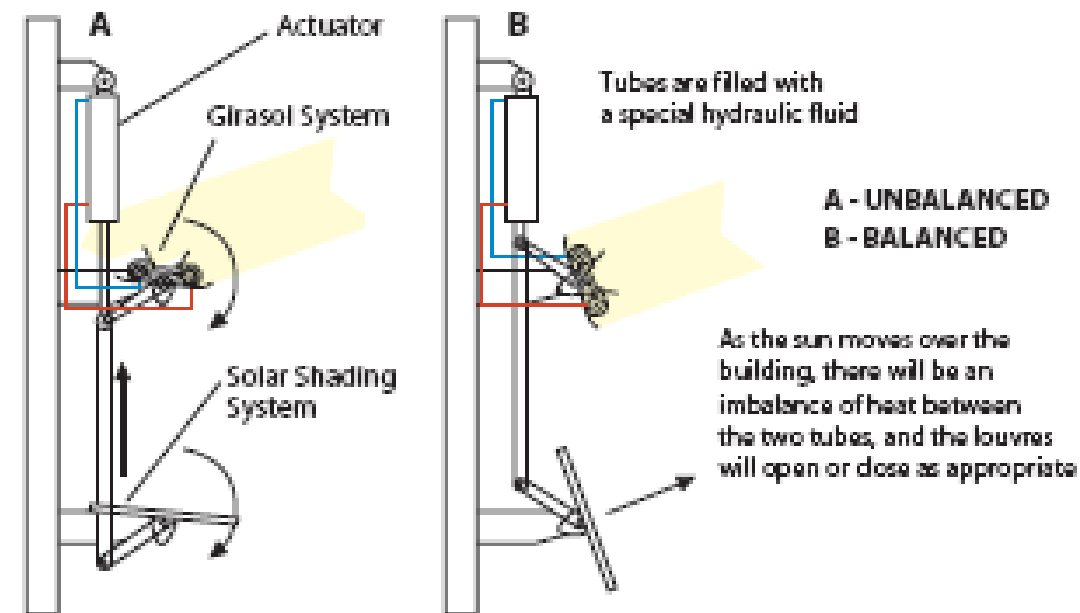


Arcade Entry



Louvers & Trellis





Facade Shading with Passive Control

Controller for movable-fin facade shading systems uses thermohydraulics that react to solar exposure.



Colt's Solarfin facade shading system on Johnston Press building in Sheffield, England.



Papago Gateway Center

Double skin louver skin wraps the building on the east, south and west sides

Mandatory Measures

- Energy Efficiency
 - Building must be designed to be at least 15% above IECC (International Energy Conservation Code) OR meet Energy Star for Homes standard



REScheck

www.energycodes.gov



www.energystar.gov



Green Permit Activity

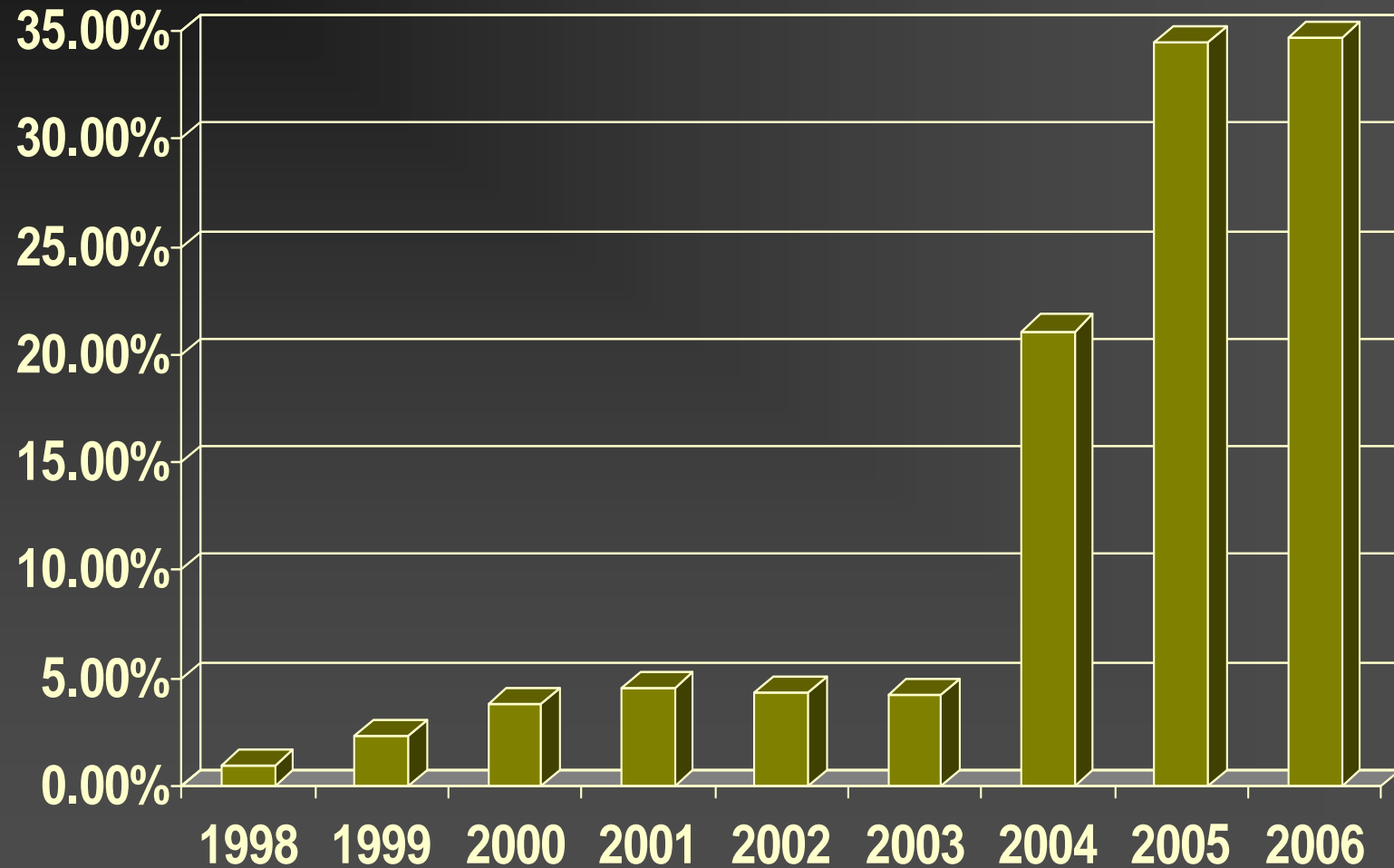
■ 2005

- 34.5% of all new single-family permits were green projects
 - 436 out of 1263 permits

■ 2006

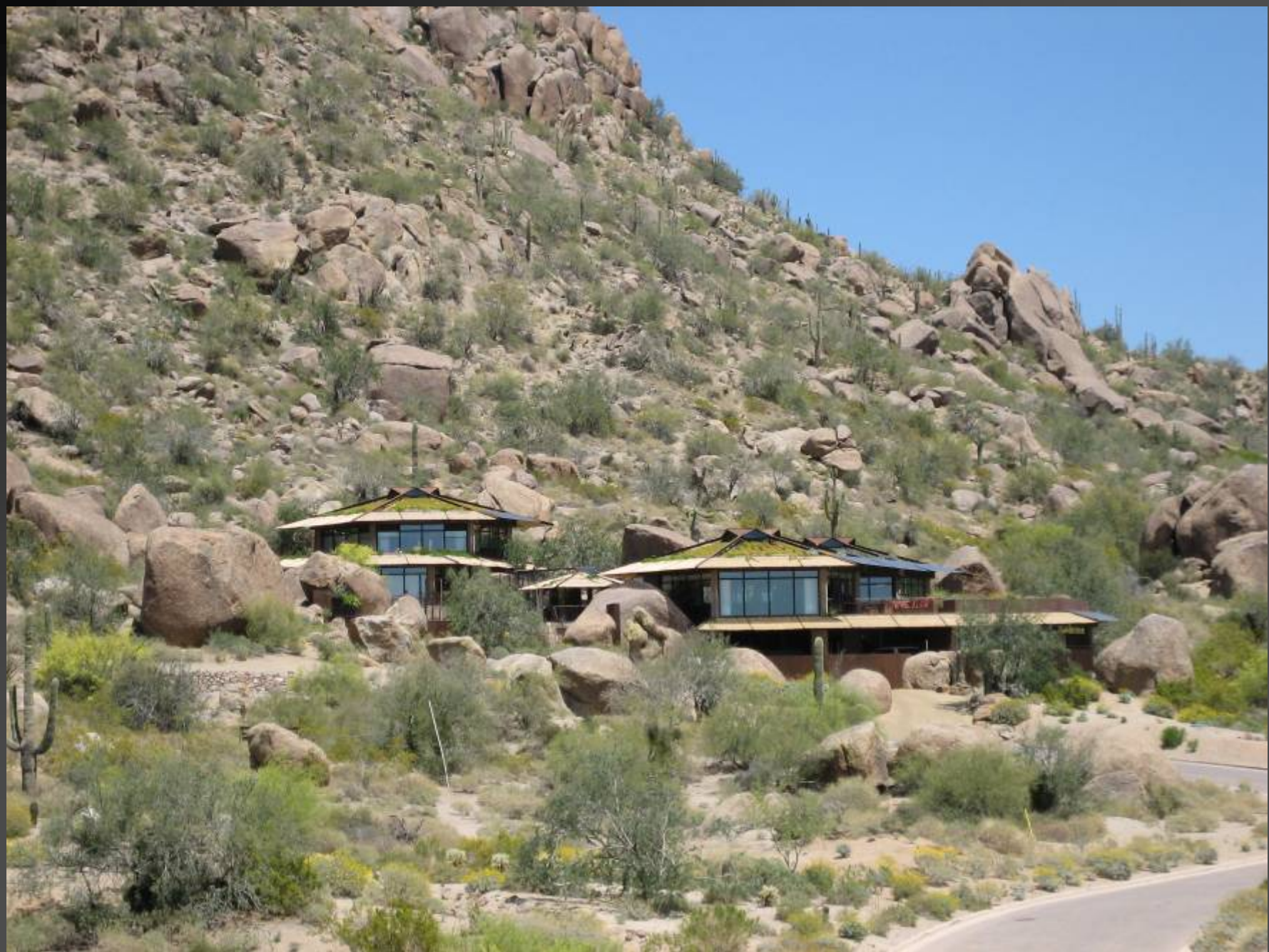
- 34.7% of all new single family permits were green projects
 - 371 out of 1069

Total Green Home Permit Activity

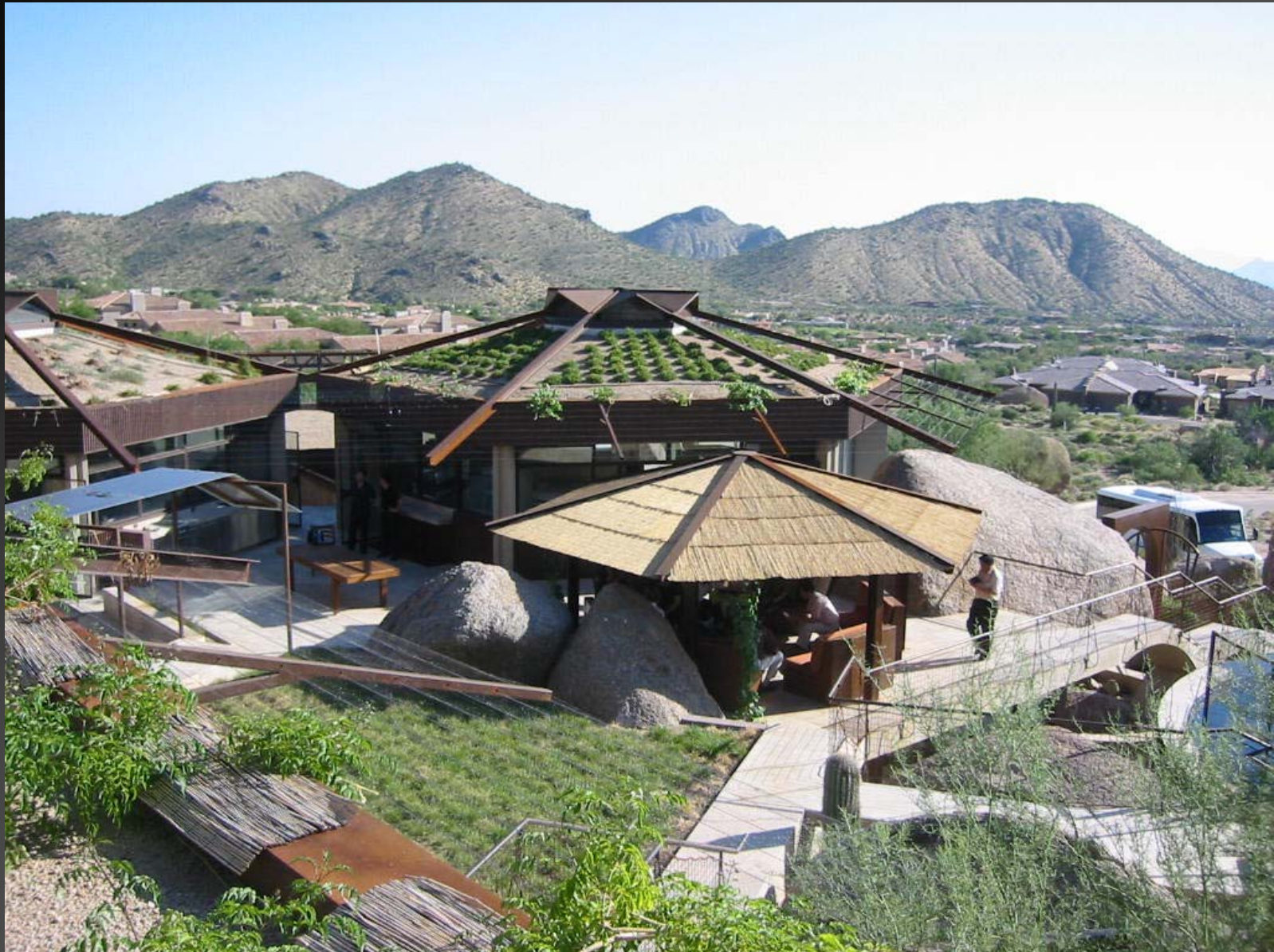




Beaulieu Residence
Green, Earth Sheltered, Hydrogen House

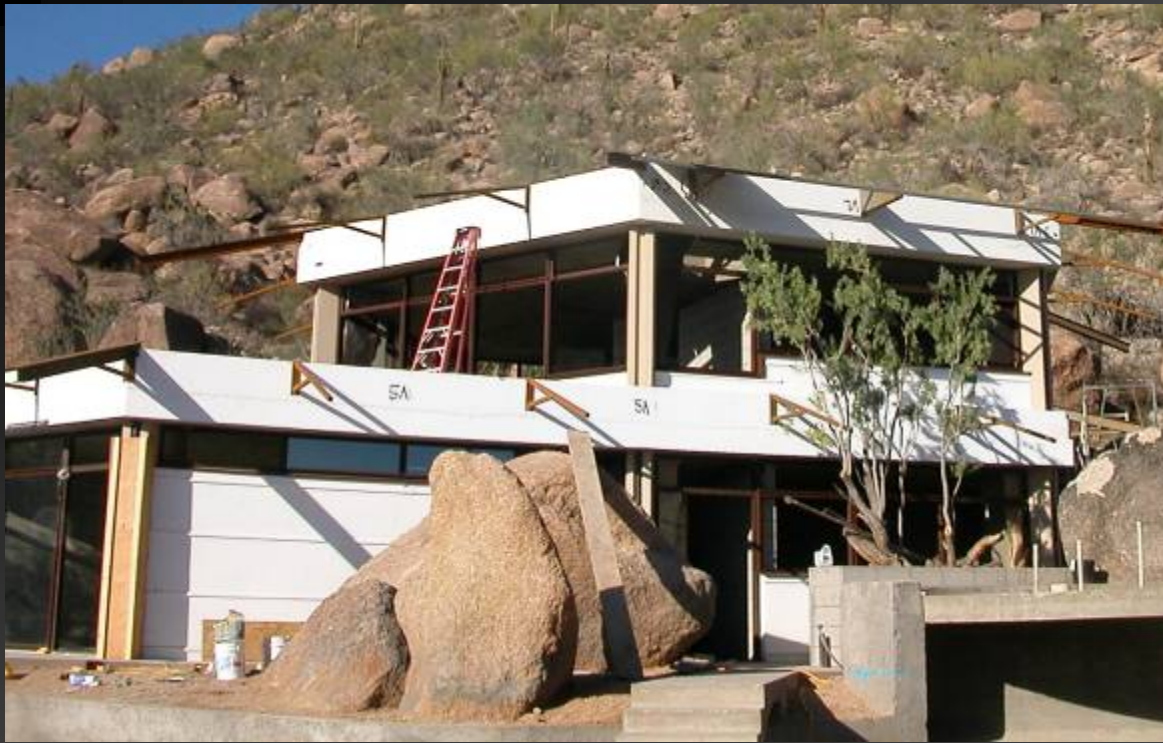






Beaulieu Residence
Green Hydrogen House

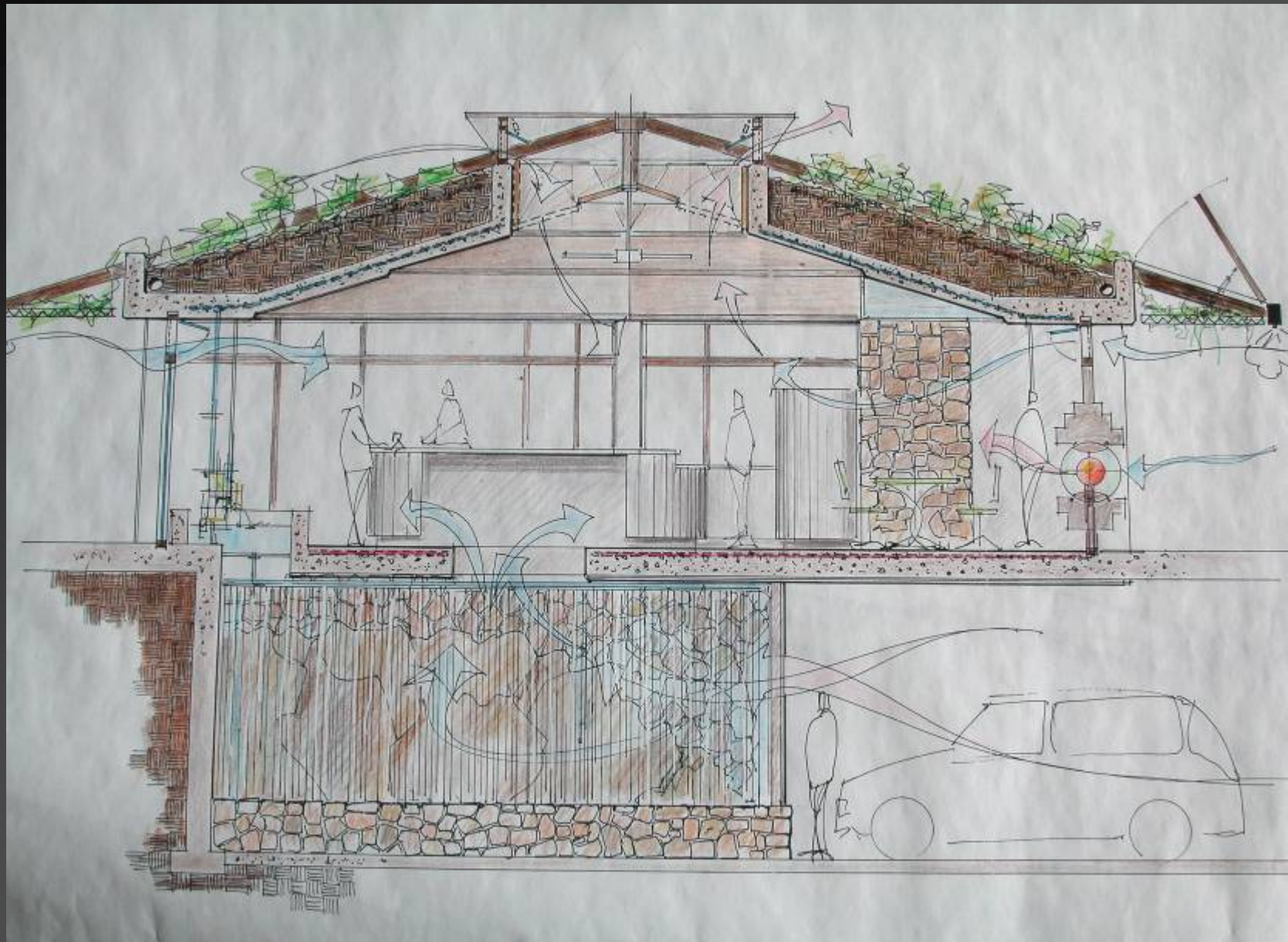




Beaulieu Residence







Beaulieu Residence



Beaulieu Residence





Hovey Residence
Building Integrated PV



Foster Residence
Autoclaved Aerated Concrete
Edwards Design Group



Foster Residence – Daylighting, Solar Power, Framing
Edwards Design Group



Strata International – Saebi Alternative Building System



Hayden Array
Modus Development – merz project



Optima Camel View Village
Largest Scottsdale Green Building Project
11 buildings - 700 residential units - 38,000 sq. ft. retail – 13 acre site

Optima Camel View Village



Each unit has its own vegetated terrace, the buildings step back with a maximum building height of sixty-five (65) feet to retain human scale.



Vegetated Roof and Desert Landscaping

- Cleansing of airborne toxins, recycling of nutrients, and air re-oxygenating
- Absorbs sound thereby reducing noise levels
- Cooling effect through transpiration and absorption of solar radiation by desert adapted vegetation
- Roof protection from ultraviolet light
- Storm water management
- Rainwater collection and storage will be incorporated where possible for irrigation



Safari Drive

Cool Tower at Plaza / Pool Area
Scottsdale Green live/work mixed-use village

WWW.SAFARIDRIVESCOTTSDALE.COM
480.222.2642

EVAPORATIVE COOL TOWER

WARM DESERT WIND COOLS BY EVAPORATION AS IT PASSES THROUGH A GRILL WETTED BY A LOW-ENERGY 12V PUMP SIMILAR TO THE RADIATOR IN A CAR



PASSIVE EVAPORATIVE COOLING TOWERS HAVE BEEN USED FOR CENTURIES IN MIDDLE EASTERN CITIES LOCATED IN ARID CLIMATES

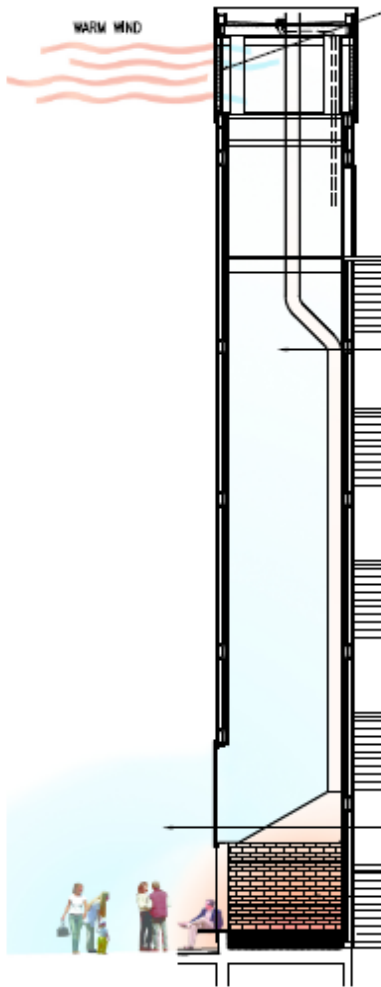
AS THE AIR COOLS IT BECOMES HEAVY AND DROPS DOWN THE "CHIMNEY" WHERE IT IS DELIVERED INTO THE COURTYARD BELOW. THIS PASSIVE SYSTEM IS EXTREMELY ENERGY EFFICIENT AS IT DOES NOT REQUIRE MECHANICAL FANS OR COOLING EQUIPMENT AND THE HIGH ELECTRICAL LOADS THAT SUCH EQUIPMENT REQUIRES



COURTYARD AT BASE OF TOWER

ON A 115° DAY, 75° AIR CAN BE PRODUCED BY THE COOL TOWER RESULTING IN A COMFORTABLE OUTDOOR OASIS

A FIREPLACE IS INCORPORATED AT THE BASE OF THE TOWER TO HEAT THE COURTYARD ON COOL WINTER EVENINGS. HEAT FROM THE FIRE IS EXHAUSTED UP THROUGH THE CHIMNEY



SAFARI
DRIVE

MILLER HULL
VANGUARD
PROPERTIES



Safari Drive Cool Tower



Scottsdale Green
live/work mixed-use village



Scottsdale Waterview
Scottsdale Green live/work mixed-use village

Future Changes

- Building Code Amendments
 - Effective September 2007
- Green Building Rating Updates
 - Mandatory Items
 - Incentives (feebates & rebates)
- Mandatory Measures
 - Green building standards